

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference TS 1086 PCT	FOR FURTHER ACTION See Form PCT/PEAA16	
International application No. PCT/EP2004/050955	International filing date (day/month/year) 28.05.2004	Priority date (day/month/year) 29.05.2003
International Patent Classification (IPC) or national classification and IPC B01D53/86, B01D53/14		
Applicant SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> sent to the applicant and to the International Bureau) a total of sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand 25.02.2005	Date of completion of this report 06.09.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Faria, C Telephone No. +31 70 340-	



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-17 as originally filed

Claims, Numbers

1-10 as originally filed

Drawings, Sheets

1/1 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify)*:
 - ☐ any table(s) related to sequence listing *(specify)*:

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-10
	No: Claims	
Inventive step (IS)	Yes: Claims	1-10
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-10
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

**INTERNATIONAL PRELIMINARY
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International application No.

PCT/EP2004/050955

Reference is made to the following documents:

D1: EP 324526 (cited by the applicant)

D2: US 6156205

The application concerns a process for the removal of SO₂, HCN and H₂S and optionally one or more compounds from the group COS, CS₂ and NH₃ from a gas stream.

Document D1 considered to be the closest prior discloses a process for the removal of H₂S, COS and CS₂, possibly in combination with HCN, O₂ and SO₂ in a reducing CO containing stream comprising the steps of:

- a) converting a portion of the CO present in the presence of a catalyst with hydrogenation of any O₂ and/or SO₂ present;
- b) catalytically hydrolysing COS and/or CS₂, possibly in combination with HCN with water and
- c) removing substantially all sulphur components from the gas stream, by a method known to those skilled in the art, namely adsorption, absorption or selective oxidation.

The subject-matter of claim 1 and D1 differ in that the preferred type of process for the removal of H₂S is not specified, and is therefore new (Article 33(2) PCT).

In the process described in claim 1 the preferred method for removal of H₂S is the use of an alkaline washing solution and its regeneration by contacting with a sulphide oxidizing bacteria to obtain a sulphur containing slurry and a regenerated alkaline washing solution that is recycled to the washing step.

The use of an alkaline washing liquid that is regenerated by means of a sulphide oxidizing bacteria allows for the use of an high pH and as result the required quantity of washing liquid is substantially reduced and the required equipment can be smaller and less expensive compared to other H₂S removal methods (see D2)

The problem to be solved by the present application can thus be considered as how to efficiently remove H₂S in a process for the removal of SO₂, HCN and H₂S and the solution thereto the use of an alkaline washing liquid that is regenerated by means of a sulphide oxidizing bacteria.

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The solution proposed in claim 1 is neither disclosed or suggested by the available prior art and the subject matter of claim 1 is considered to be inventive (Article 33 (3) PCT).

Dependent claims 2-9 also meet the requirements of PCT with respect to novelty and inventive step.